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ABSTRACT

The International Labour Office (ILO) is in the process of developing an Inter-Regional Training Information System (IRTIS) for developing countries. This system aims at the introduction of common standards and techniques, in all regions and at the national level, for processing and retrieval of information on training. This report elaborates a medium-term plan (for the years 1984-1989) for the development and implementation of IRTIS. The plan covers the following areas: (1) guidelines for the development and maintenance of eight specialized databases (training materials, institutions, programs for trainers, legislation, research activities, expertise, sources of information, forthcoming events), including technical specifications, methodological tools and standards, and organizational framework; (2) a description of the network functions, procedures, methods, and plans for their development; (3) a description of computing system requirements covering equipment, programs, training of information personnel and information users; (4) the scheduling of development operations; (5) an analysis of resources requirements; and (6) the features and facilities of the system. The report also discusses policy issues and future technical tasks. (KC)

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TRAINING POLICIES

Discussion Paper No. 7

INTER-REGIONAL TRAINING INFORMATION SYSTEM (IRTIS)

A PROPOSAL FOR A MEDIUM-TERM DEVELOPMENT PLAN

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

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CONTENTS

		Page
PREFACE		(i)-(ii)
INTRODUCTION		1-2
- Aims and objectives		1
- Methods and procedures		1
- The report		2
Chapter I.	IRTIS AIMS AND DESCRIPTION	3-6
	A. Products and services	3-5
	1. Products	3-4
	2. Services to support products	4-5
	B. Growth and size of IRTIS	5
	C. Users and audience	5-6
Chapter II.	IRTIS WITHIN THE ILO	7
	A. Organisational	7
	B. Technical	7
Chapter III.	DEVELOPMENT POSSIBILITIES	8-21
	A. Phased development	8-12
	1. Phase one	8-9
	2. Phase two	9-10
	3. Phase three	10-11
	4. Phase four	11-12
	B. Communication alternatives	12-15
	1. Classic star	13
	2. Star-ring	13-14
	3. Connected network	14-15
	4. Discussion	15
	C. Data base	15-18
	1. Central data base	15-16
	2. Regional data bases	16
	3. Alternatives	16-17
	4. Discussion	18
	D. Processing organisation	18-20
	1. Data input or entry	19
	2. Data base maintenance	19
	3. Query formulation	19-20
	4. Query searching	20
	5. Discussion	20
	E. Recommendations	21
Chapter IV.	DEVELOPMENT PLAN	22-30
	A. Activities	22-24
	1. Standards	22
	2. Network	22-23
	3. Systems	23

	4. Data input	23
	5. Training and documentation	23
	6. Administration	23-24
B.	Timescale	24-27
C.	Resources	28-29
	1. Human	28
	2. Computer	28-29
	3. Communications	29
	4. Other resources	29
D.	Regional centres	29
E.	National centres	30
F.	Training	30
Chapter V.	POLICY ISSUES	31-32
A.	Geographic/State coverage	31
B.	Intermediaries	31
C.	Training	31
D.	Bilateral co-operation	31
E.	Standards	31
F.	Inter-system relationships	31-32
G.	Subject coverage	32
H.	Development funding	32
APPENDIX	TECHNICAL TOPICS FOR INVESTIGATION	33-35
A.	Communication links	33
B.	Network commands	33-34
C.	Cataloguing support	34
D.	Inter-centre procedures	34-35
E.	Record formats	35
F.	Material delivery	35

PREFACE

The idea of launching the Inter-Regional Training Information System (IRTIS) was born of the need for information on different aspects of training in many countries. The type of information needed fell into three distinct categories: the first concerned the need for countries to be better informed of their own training situation, i.e. to know, and understand, exactly what exists at the national level with regard to programmes, methodology, manpower, infrastructure, research, etc.; the second need concerned these countries' desire to learn about the policies, and other aspects of training, pursued by their neighbours and other countries with whom they had special links; and the third need concerned the desire to have access to relevant information on problems or specific areas of training anywhere in the world.

There are at least as many different types of training information user as there are subjects and questions related to training. These users can be found in every walk of life, in political circles, in the civil service, in employers' and workers' organisations, in enterprises, in research institutes or, of course, in training institutions themselves. The range of training information products and services should, consequently, be extremely varied and comprise, for example, not only selective bibliographies, but also specific analytical information on training systems, on legislation and on the financing of training, as well as data on training material, on training institutions, or on programmes, to cite but a few of the areas to be covered. The ILO, in co-operation with APSDEP, CIADFOR, CINTERFOR and the International Centre for Advanced Technical and Vocational Training (Turin Centre) created IRTIS in order to meet the need for this kind of information and to make it readily available to all those interested in training.

From the outset, it was agreed that the development of IRTIS would be guided by the basic principles which comprise the policy framework within which it will operate. Thus, as a part of the ILO's world-wide effort to improve the availability of information on the world of work, IRTIS is a specialised system within the International Labour Information System (ILIS) and contributes to the overall congruity of this global endeavour.

IRTIS has to meet the information users' needs where these needs occur, i.e. within the ILO Member States themselves. This in itself implies that IRTIS aims to satisfy the needs in the ILO Member States and has not been created to meet the need for information within the ILO alone.

These basic principles have affected other choices in the development of IRTIS. For example, they have made IRTIS a co-operative information system within which the partners may benefit from the training information products and services which they have themselves helped to develop. Consequently, IRTIS can be called a decentralised system, since each region and, eventually, each Member State, will be responsible for the identification and analysis of training information in its own geographic area. Furthermore, because of this decentralisation, the partners will be expected to contribute to the development and management of IRTIS.

IRTIS's objective of meeting the needs of training information users required that access to training information at the national level be improved through the strengthening or establishment of training information units in the countries associated with IRTIS. IRTIS is therefore intended to help those countries concerned about training information and who are ready to commit themselves to its improvement.

The setting-up of a co-operative information system, which is both decentralised and inter-regional, necessitates joint methods of approach and processing, as well as a common language and common standards. For this reason, it was decided to make use, as far as possible, of international standards on information processing and to rely on a specialised documentary language such as the ILO Thesaurus which covers labour, employment and training terminology. The consistency of the system as a whole lies in particular attention being paid to the training of those involved in processing information as well as to the training of the users of IRTIS products and services.

The variety of training information users and the diversity of available training information products and services necessitates the establishment of certain priorities. Up to now, the main criteria used were, on the one hand, the interest shown by a number of countries identified through analyses of training information needs and, on the other, the possibility of a training product or service fostering co-operation between countries.

The decision to launch IRTIS was taken in 1981 by the chiefs of APSDEP, CIADFOR, CINTERFOR, the Turin Centre and the ILO Training Department. Three initial areas of work were identified: training material, a common documentary language and training of trainers programmes. The work on the training material resulted in the development of a common indexing and cataloguing system which was then tested to ensure that the data base would respond to the specific, specialised requirements of trainers in their search for training material. Work on the ILO Thesaurus consisted of up-dating it and adding new descriptors to improve its content and compatibility with other thesauri devoted to the fields of education and training. An analytical framework for the training of trainers programmes is at present being tested.

The partners associated with this first phase to launch IRTIS were mostly regional institutions, the Turin Centre and the ILO itself. Since a number of Member States are interested in IRTIS, a new phase should soon begin including to start with a few national institutions from different parts of the world as partners in the development of IRTIS. In the next phase, participation in IRTIS will be progressively extended to include a maximum number of countries.

As the interest in IRTIS increased, so did the number of fields of study which could be dealt with by the system.

In view of the above, the Training Policies Branch of the ILO foresaw the preparation of a medium-term plan for the development of IRTIS. The draft plan outlined here was drawn up with the collaboration of Informatics Engineering Ltd., United Kingdom. It will serve as the basis for discussion between the IRTIS partners and to stimulate thought on the future development of this specialised information system. The results of these discussions, as well as reactions to the draft plan, will be taken into account when the definitive IRTIS development plan is drawn up.

IRTIS is certainly a long-term and ambitious undertaking. To appreciate its impact, it should be remembered that in every region, in every country, the development of training is frequently hindered by a lack of access to necessary information. Many countries therefore decide to invest, each in its own way, in setting-up training information systems suited to their own needs.

In the long run, it is hoped that IRTIS will become the common factor in fostering communication between countries trying to establish or improve their own training information systems.

INTRODUCTION

1. The International Labour Office (ILO) is in the process of developing an Inter-regional Training Information System (IRTIS). This system aims at the introduction of common standards and techniques, in all regions and at the national level, for processing and retrieval of information on training. IRTIS will be the result of an inter-regional co-operative effort.

Aims and objectives

2. The objective of this report is to elaborate a medium-term plan (1984-89) for the development and implementation of IRTIS. The proposal for a medium-term plan, as herein encompassed, covers the following areas:

(a) guidelines for the development and maintenance of eight specialised data bases (training materials, institutions, programmes for trainers, legislation, research activities, expertise, sources of information, forthcoming events), including:

  (i) technical specifications;
  (ii) methodological tools and standards;
  (iii) organisational framework;

(b) a description of the network functions, procedures, methods and plans for their development;

(c) a description of computing system requirements covering equipment, programmes, training of information personnel and information users;

(d) the scheduling of development operations;

(e) an analysis of resources requirements;

(f) the features and facilities of the system.

Methods and procedures

3. In order to produce the medium-term plan, two consultants, P.L. Noerr and K.T. Bivins Noerr, of Informatics Engineering Ltd., England, were contracted. The consultants proceeded in three stages:

(a) collection, reading and evaluation of background literature on the ILO, its information systems, relevant regional centres and national centres/institutions and all documentation pertaining to IRTIS;

(b) discussions and interviews at the ILO;

(c) analysis of results and production of draft plan, revisions and production of final version.

The report

4. The report consists of the following chapters:

- Introduction;
- IRTIS aims and description;
- IRTIS within the ILO;
- Development possibilities;
- Development plan;
- Policy issues;
- Future technical tasks.

I. IRTIS AIMS AND DESCRIPTION

5. Training is a critical element in all areas of the world, and is of special importance in developing countries. The major goal of IRTIS is to collect, process, store, retrieve and disseminate information on training. It is intended that this effort originate at the national level.

6. Access to information on training is of great significance, and therefore IRTIS aims at providing access to end users. This reinforces the intention of IRTIS to concentrate its efforts on the national level. The ILO and regional levels will be of importance on a continuing basis, as there will be a need for organisation of the co-operative effort which will take place. In addition, the regional centres in particular will be heavily involved in larger-scale operations, such as the processing and production of lists and registers of information.

7. At present, the Training Policies Branch of the ILO is responsible for the development of IRTIS. It is collaborating in this effort with regional institutions concerned with training in Africa, Asia, the Pacific, Europe and Latin America. The ILO International Centre for Advanced Technical and Vocational Training in Turin is also associated with this venture. All these organisations, and representatives of national institutions and centres, are together working on developing procedures and standards to be used in IRTIS.

8. This co-operative development is essential. Individual countries can use it to help determine their information requirements at the national level, and to experience the benefits of co-operative action within the field of information supply. The ILO can use it in part as a mechanism for deriving its working procedures for information systems, and as a means of determining more accurately the needs of the member States, and ways of more effectively fulfilling them.

A. Products and services

9. This subchapter will describe an "ideal" list of products and services which IRTIS can provide in due course. Some of the elements of the list are self-explanatory, but others are expanded in more detail.

1. Products

(a) Information services. These consist of data bases and information on their contents.

(i) Data bases - the following is a list of the subject content of eight data bases. It is anticipated that the data base content will expand in due course to include not only vocational training information, but also information on the whole field of training.

- training materials;
- training institutions;
- programmes for trainers;
- legislation on training;
- expertise in the field of training;
- research activities on training matters;

- sources of information on training;
- forthcoming events in the field of training.

(ii) Data base directory - provides information about the contents of the different data bases, as well as information on sources of further information and expertise on training matters.

(b) Processing services. These are products which involve "doing something" with information, whether it is producing lists or ordering books, or analysing data.

(i) ordering materials;
(ii) delivering materials;
(iii) bibliographies - specialised bibliographies;
(iv) directories/lists of various sorts;
(v) statistical analyses;
(vi) text processing.

2. Services to support products

(a) Access services. It should be as easy as possible for users to find information. "Access" means making it easier.

- One step to multiple sources. It should be possible for users to have a single source of directory information to the possible suppliers of useful information, and then be able to contact them;
- International gateway. This is a facility to access data bases of information in other parts of the world through the shared use of existing networks.

(b) Administrative services. These are services such as printing, arranging for document delivery, helping with staff supply, etc.

(c) Help services. These are services to help users obtain the best use from IRTIS. They must handle both beginners, infrequent users and experts. They must also be able to explain to users the reason(s) for abnormal performance.

(i) Help desk(s) - IRTIS - organised training courses on how to use IRTIS and its products and services.
(ii) Online instruction - automated instruction.

(d) Standardisation services. This involves decisions on procedures, tools, working methods, etc.

(i) input/output procedures;
- Thesaurus;
- Bibliographic description;
- Other formats;

(ii) Query language
- Standard method of asking questions of the data base(s).

(e) Marketing, public relations

Newsletters, etc.

(f) Group services

providing for continuing co-operation of the various classes of groups associated with IRTIS.

- users;
- hosts (organisations having data bases);
- telecommunications authorities;
- other systems/networks.

(g) Equipment and suppliers services

providing for purchase, maintenance, etc., of equipment for IRTIS.

B. Growth and size of IRTIS

10. At present, it is anticipated that each of the IRTIS data bases will be of a relatively small size. "Small" in the information business means a data base of less than 100,000 records. "Very small" is less than 20,000 records.

11. It is not thought that, for quite some time, any of the planned data bases would be larger than about 20,000 records. It is also not thought that the growth rate would be more than could comfortably be maintained by regional/national centres.

12. These factors mean that a microcomputer could quite easily handle the storage and processing requirements of IRTIS, on a local basis, and that even the entire data base (all eight) could be locally stored, should that be a desirable option. This is further discussed in Chapter III.

13. It should be pointed out here that it is not a requirement for participation in IRTIS that a centre have a microcomputer, or any computer for that matter. Data may be stored at another site and another centre may perform computer searches for a centre which does not, as yet, have its own equipment. It is the vital stage of contact with the end users where each centre has a role to play, the more mundane task of storing and processing the data can be shared for convenience and efficiency.

C. Users and audience

14. IRTIS will interest four different types of users: policy-makers, management and organisation decision-makers, trainers and researchers. Policy-makers include members of governments, members of parliaments (or equivalent), senior civil servants of the various administrative divisions, and heads of employers' and workers' organisations. Management and organisation decision-makers include heads of training institutions, managers, personnel managers, heads of training departments, trade union representatives, and those civil servants responsible for enforcement of training legislation. Trainers include vocational guidance personnel, instructors of training centres, trainers within undertakings and technicians. Researchers include planners, scholars, documentalists, research institutions and information centres.

15. Through its services, IRTIS will attempt to improve both the delivery and dissemination of information on training. Dissemination will be improved by providing both better and easier access, and by publicising the availability of IRTIS information. Delivery will be improved by utilising every available, practicable means of physically moving documents. These include microfiche, centralised stores in regions/countries, customised delivery services, and the

like. Centralised stores allow for pooling difficult to obtain material at a convenient location. Customised delivery services means taking advantage of local conditions, such as rail links instead of air, courier delivery, or delivery via local institutions with special equipment, etc.

16. The list of products and services for IRTIS is a formula for an effective information service. Chapters III and IV suggest means for accomplishing this.

II. IRTIS WITHIN THE ILO

17. This chapter discusses IRTIS within the ILO, both from an organisational and from a technical viewpoint. By organisational is meant the various other systems within the ILO. By technical is meant current ILO hardware, software and input/output methods and procedures in use.

A. Organisational

18. The ILO has a number of established information systems, and is in the process of planning others, including IRTIS. Integrating system efforts is ILIS, International Labour Information System. ILIS can be seen as a "system-of-systems", an umbrella system, which has as its primary role that of setting policies and standards for the implementation of labour information systems. This effort is in the preliminary stages as yet.

19. Existing information systems include LABORDOC, a general bibliographic data base on labour information; CIS, a data base on occupational safety and health; QUALIS, a data base on conditions of work; and LID, a labour information data base. In addition, a data base on labour legislation is in the planning stages.

B. Technical

20. One of the development principles of IRTIS is to use techniques already in existence if at all possible. Preference will be given to techniques used and well known within the ILO for the sake of coherence and compatibility. They may require adaption or expansion in some cases. If no such technique or standard exists then IRTIS must develop its own bearing in mind experience within the operational information systems.

21. At the present time, most ILO information systems run on the Hewlett-Packard 3000's MINISIS software. MINISIS is a library management software package, which also incorporates good information retrieval capabilities. There is an ILO thesaurus, and standard procedures for describing documents of many different types.

22. The partners in IRTIS have so far agreed to use the ILO thesaurus as the basis for document content descriptions. Together with the ILO library, the IRTIS partners are contributing to the updating of the ILO thesaurus and its extension to meet the requirements of specialised IRTIS data bases. A descriptor worksheet has been developed and is being used for this purpose. Currently the new descriptors are being incorporated into the ILO thesaurus but, if they seem to be creating an imbalance, a mini IRTIS thesaurus may have to be developed as a specialised extension to the ILO thesaurus.

23. IRTIS will use the standard bibliographic procedures, as set down by the ILO library. It has developed a worksheet for training materials and plans to develop worksheets for the other planned data bases.

24. In all these areas, it is important to note that care must be taken to co-operate with all ILO information systems, and in particular to liaise with ILIS to ensure compatible development.

III. DEVELOPMENT POSSIBILITIES

25. This chapter outlines the possible paths for development and the various alternatives for different aspects of the network. It discusses first the phased approach to growth of the network as far as the systems components are concerned. Then the alternatives for their technical aspects of communications and data base distribution are considered. The organisational aspects of the network are considered and finally a recommendation as to a mixture of alternatives for the eventual system network is given.

26. Throughout, the major services to be considered are the entry of data (cataloguing and indexing) and the posing and answering of questions of a bibliographic search nature.

27. The development is envisaged as a partnership in which all the participants share the tasks and take part in the learning processes. Because of existing resources and for ease of description, three categories of institutions are used for the remaining sections as follows:

(a) "national institutions" - the national institutions and centres within the member States;

(b) "regional centres" - the Regional Centres (APSDEP, CIADFOR, CINTERFOR, the Turin Centre;

(c) "ILO" - the ILO represented by Geneva.

Although these categories have been named for their likely members, it is certainly possible for large national institutions to run a "regional centre" node, (in a network, a "node" is a local processing site) and for regional centres to remain as "national institution" nodes for some time. In many ways a mix like this is to be preferred as the load can thus be best shared.

A. Phased development

28. Development of a system as far-reaching as IRTIS must be undertaken in stages. This allows for the services and facilities to be expanded as experience grows and local conditions allow. It allows a relatively small start to be made with a single system and mistakes to be made on this before an expensive total network is implemented.

29. That said, it is quite possible for different institutions to exist within the network at different phases as their resources permit.

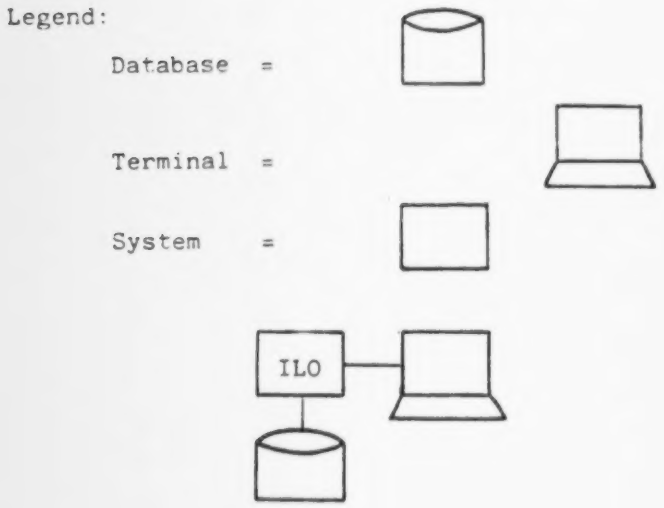
1. Phase one

30. At this earliest stage a central system should be run by the ILO which provides access to a data base and a range of products (see Chapter I).

31. Data entry to the system will be done centrally from worksheets which have been prepared regionally (or nationally). These will be posted to the central site on a regular basis. It is to be hoped that staff from the regional and national institutions would be invited to Geneva to participate in the process.

32. Queries will be handled in a similar manner by sending them to the central system for processing and returning the answers to the regional centres and then to the requesting institutions.

Phase one system



33. This allows that a system can be implemented at the ILO where it can be monitored for performance, and actual operation. The regional and national centres can initiate and refine administrative procedures. Central data entry allows for easier control of such matters as index vocabulary to maintain the integrity of the data base.

34. It does not require any special communications facility and thus will be a model for the use of the system by newer partners at later stages of the development. It allows a small start so that mistakes will not be expensive, can be easily rectified, and experience can be gained and shared among those who, at later phases, will be on their own.

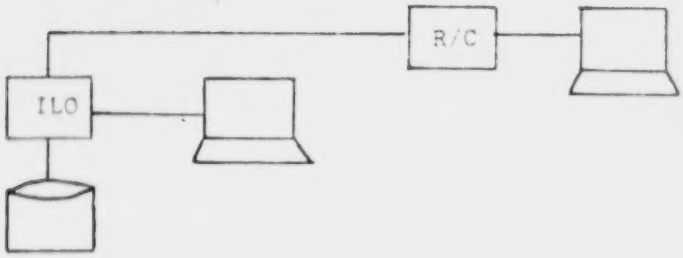
2. Phase two

35. In this phase the regional centres start to acquire local systems which can communicate with the central system. The central system can also be connected to external publicly accessible telecommunications networks to experiment with this form of access.

36. Data entry in this phase will be partly local and partly central. The local systems will allow for records to be entered into the local system (not stored in a data base). These records are then transmitted to the central system either via a telecommunications link or by posting floppy disks depending on local capabilities and economics. At the central system the records are processed by the cataloguing and indexing routines and are controlled as to vocabulary and authority information, and entered into the data base.

37. Queries follow a similar route and may be locally formulated and transmitted either via a computer link or via the post.

Phase two system



38. The introduction of the telecommunications link obviously speeds up the processing of the data entry and the queries in that the postal delay is now absent. It is not necessary to introduce both together. Using a terminal and a connector device attached to a telephone (a modem) to "dial-up" and query data bases elsewhere is a relatively simple process to implement. This could be introduced before attempting a local input system, which would mean "sending" the data through the telephone lines into a data base at some other location.

39. As well as an increase in speed, the introduction of a reasonably sophisticated local system allows for other functions to be considered locally. (The nature of these functions is outside the brief of this report, but such things as local word processing, accounting, address and mailing lists, subscriptions, etc. are all possible.) This is because it is necessary to introduce a microcomputer to run the local system at this point. Even though it may not have a sophisticated set of IRTIS functions it is still a powerful computer and as such can run other programs completely independently of its functioning as an IRTIS system.

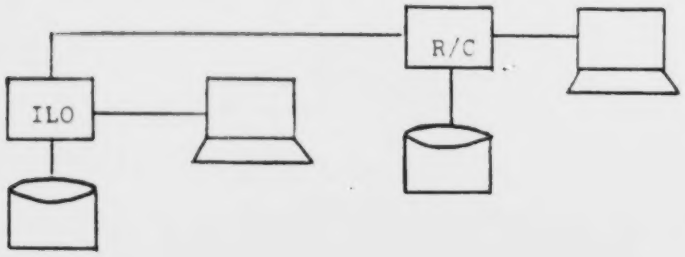
3. Phase three

40. During this phase the local systems are connected online to the central system and through it, as a switching centre to each other. They acquire the capability to maintain a local data base of their own and the capacity to search and process it locally, entirely divorced from the central system and the communications network.

41. Data entry is now a local operation with local validation and checking and data base update. These records are then forwarded to the central system to maintain its data bases.

42. Queries follow the path of phase two and are locally formulated and processed against either the local data base or the central data base (or both) as appropriate.

Phase three system



43. The advantage to this stage is the beginning of data distribution as well as processing distribution. The regional centres are able to operate more independently and take on more of the load locally. This speeds responses and reduces dependence on fragile communications. Local information may now reasonably be held within the local system (when it was not thought worthwhile putting it on the central) thus improving the utility of the system to the local region.

44. Through the connection to the public networks other data base host systems would be available to the regional centres for searching.

4. Phase four

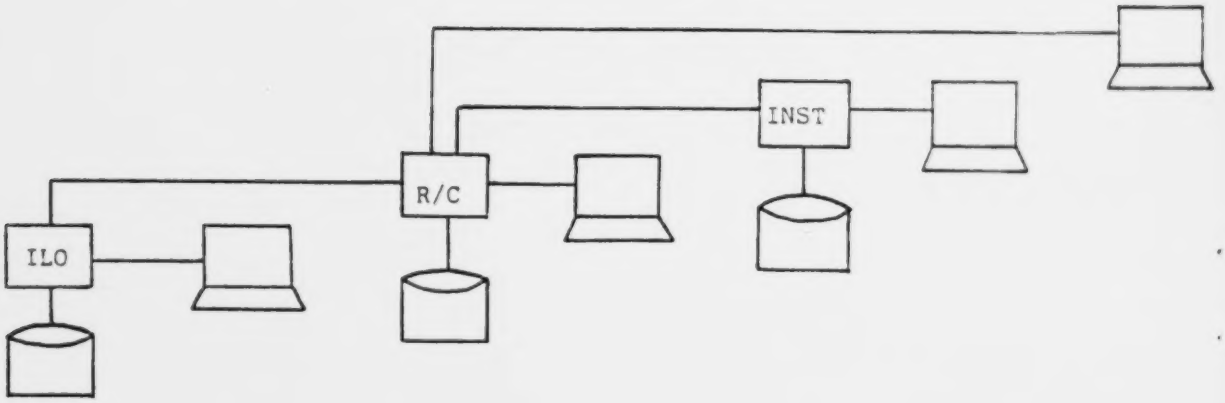
45. As the fourth phase it is anticipated that the national centres and institutions will have their own facilities to link to both the regional centre and possibly to the central network system as well.

46. For input this means that local institutions can prepare and then send data to be processed and stored within the network data bases.

47. They may wish to keep their own information locally or may search it on the network as required.

48. With this stage of the network the processing is distributed as much as possible and the flexibility is available for the distribution of data in the manner most desired. It allows the greatest flexibility for the end users (the national centres and local institutions) to make use of the IRTIS network. If they have access to local computer systems, these may be connected. If they have adequate telecommunications then a direct link may be established, and they may contact the regional centres for data input or queries which cannot conveniently be sent any other way.

Phase four system

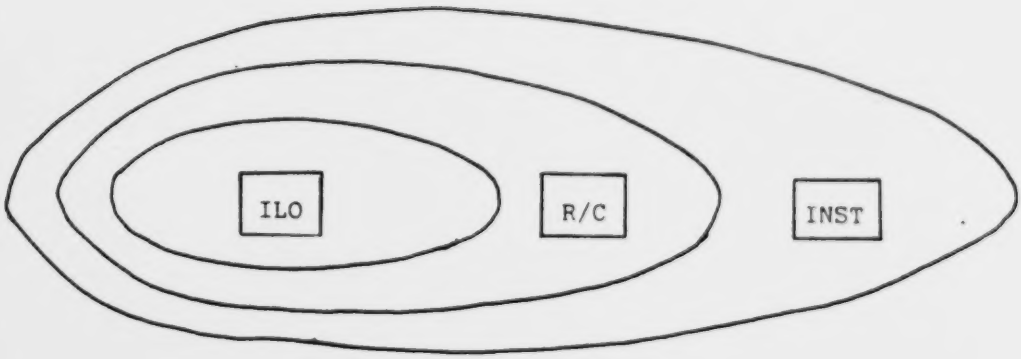


49. The advancement to any stage assumes that all the facilities of the preceeding stages are still available as not all end users will be able, or desire to proceed at the same rate of development.

B. Communications alternatives

50. For this subchapter (and the rest of this chapter) it is assumed that the IRTIS network is in phase four and that there are computer systems at three positions within it; the Institutions, the Regional Centres, the ILO. These may be represented as three concentric rings as below. Each computer system for example, a regional centre, is considered a local processing site, or node, within the entire network.

Communications levels



51. In any particular geographic region it is assumed that at any level where an institution or centre does not have a computer then it will connect to the next level up via a non-computer link.

52. Three major possibilities exist for the computer communications links within a network with three levels. These are discussed below.

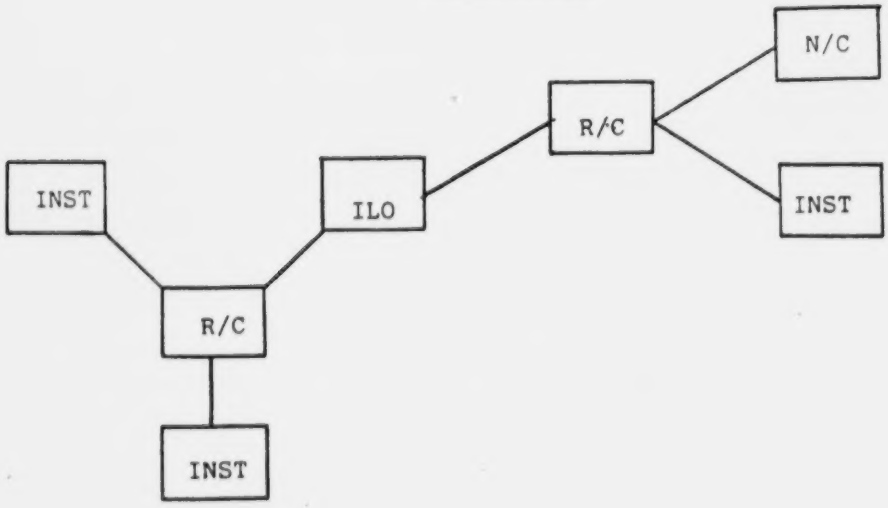
53. All communications will be handled at a physical level by the PTT authorities in the member States and the international networks to which they belong. The type of connection and the exact routing is not considered here (see Appendix) as it does not materially affect the arguments as to the network connection links

54. A connection to the publicly accessible networks could exist at almost any point in the network and does not affect the following arguments.

1. Classic star

55. This configuration is depicted below. In the classic star, a node, or local processing site, at one level is connected only to one node at the next inner level, and to any number of nodes at the next outer level.

Star network



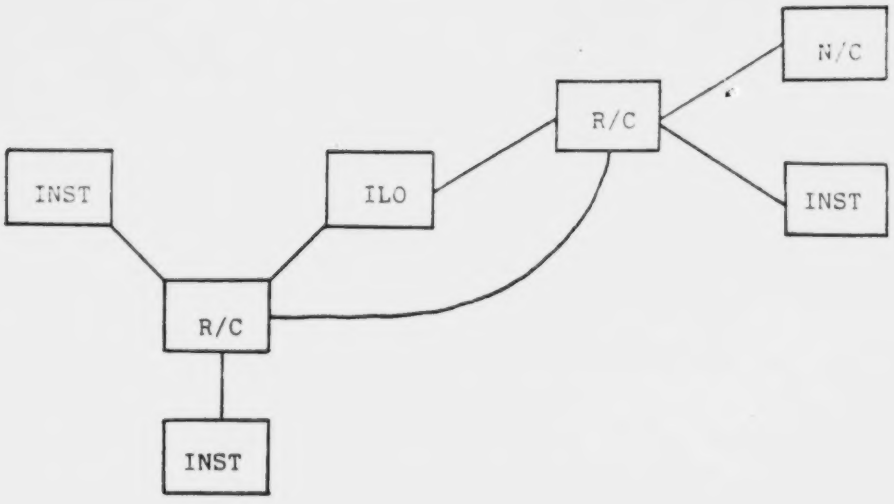
56. This is the simplest configuration and as such the least expensive. It may be the only alternative in some parts of the world where telecommunications are limited.

57. Its disadvantage is that, in theory at least, all traffic between any two nodes must pass through the central node. Equally all traffic from a node at one level must pass along a single link to the next level. Both these make the network "fragile" and possibly prone to "traffic jams".

2. Star-ring

58. This has the same basic connection possibilities as the star, with the addition of the capability of the nodes at the middle level (the regional centres) to communicate directly with each other.

Star-ring network



59. The advantage of this additional feature is that the workload between the regional centres is not channeled through the inner node. This reduces the demands on the inner computer as well as providing for alternative links to increase the robustness of the network.

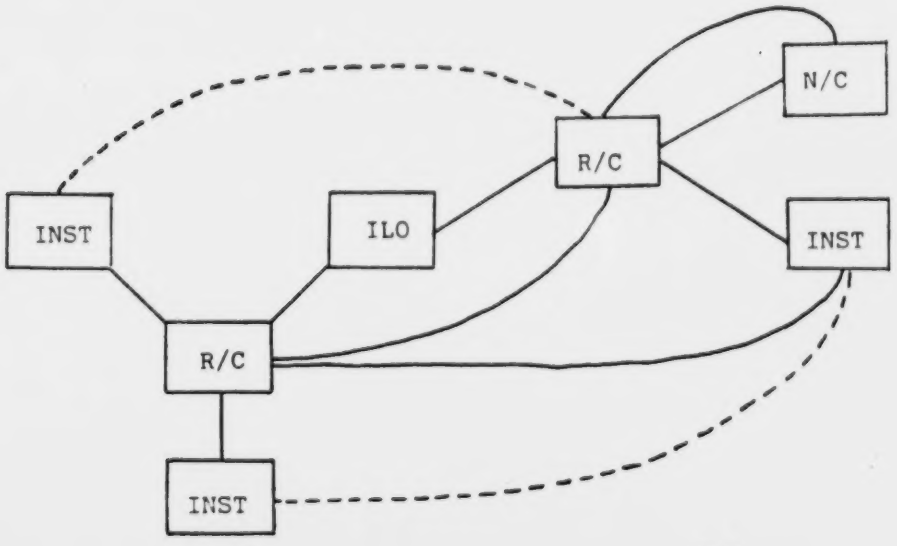
60. The disadvantage is the increased complexity of the physical links and hence their cost.

61. This alternative must be considered if it felt that there will be a substantial amount of traffic between regional centres without the need for the facilities of the central system.

3. Connected network

62. In this alternative it is possible for any system to directly link to any other. In particular it is possible for institutions to contact the central node (the ILO) or middle level nodes (the regional centres) directly.

Connected network



63. The advantage of this alternative is that traffic will only pass through that part of the network that it must and that only two computers are involved.

64. The disadvantages are again the increased complexity of the telecommunications requirements and the necessity of ensuring that all computers which can be accessed by any others are capable of responding to the request.

4. Discussion

65. The increasing flexibility of the communications possibilities offered by the three alternatives above is basically a good thing. It reduces the potential for bottlenecks and the dependence of the network on the functioning of a small number of computers. It allows for regional and inter-regional local communications.

66. It does require that users know where to talk to in the network if all nodes are possibilities. It also requires that all accessible computers are at least minimally compatible in processing command language and functions. This is an achievable aim as far as the regional centres are concerned, but is almost certainly not for the national institutions. Thus it is suggested that the second option is probably the most realistic compromise.

C. Data base

67. Once again it is assumed that three types of node exist within the network (the national institutions, the regional centres, the ILO), and that these have different requirements and resources for storing data. In general it is assumed that the national institutions will store information either produced locally (about local training) or which they think will be of special benefit to their users.

68. Four alternatives are listed. In each it is assumed that if a national institutional node has a data base then it consists entirely of material of interest to that institution. Thus all the data is local. However, it may have been created partly by copying material from other data bases within the network.

1. Central data base

69. The central system receives data from two sources; input from its own input routines (whether the worksheets for this data are generated locally or by other nodes), and from remote systems.

70. Locally-input data must be stored within the data base. (A marginal possibility is that data which is created remotely but entered centrally may be sent to the remote data base after central verification.) This data must be entered into the data base indexes for searching.

71. Remote system data may be stored in the central data base or may not. If it is stored in the data base of the regional system which sent it then there is, in principle, no reason to re-store it in th central data base. If the data is not stored regionally then it must be added to the central data base. In both cases the indexes of the central system must contain references to the data.

72. The two possiblities for the central data base are:

(a) the central data base contains all the data for the whole network and all the indexes to that data;

(b) the central data base contains only its own local data and indexes to the whole system.

73. There is obviously a third possibility; that the central system contains only local data and local indexes. This would make it exactly equivalent to the regional systems (see below) and hence not a "central" system in any data storage sense. The disadvantage of this scheme is that a query would then have to be circulated to all (regional) systems to ensure a comprehensive search. This would lead to a heavy increase in network traffic and would increase the fragility of the whole system as one of the regional systems not working would make all enquiries incompletely answered.

2. Regional data bases

74. The regional data bases may contain two types of data:

(a) all local data and indexes;

(b) a copy of all data within the network and indexes.

75. The former situation allows for searching of locally-held material without recourse to the central system. It is obviously the smaller data base.

76. The second possibility allows for local searching of all the data within the network, andd is obviously much larger.

77. It is possible to consider storage of data only (no indexes), but this requires a central index and the routing of all queries through the central system. This increases both network traffic and fragility.

3. Alternatives

78. The four alternative configurations are depicted below.

Legend: Database =

C.3.1

ALL

LOCAL

C.3.2

ALL

ALL

C.3.3

INDEX

LOCAL

C.3.4

INDEX

ALL

4. Discussion

79. For the alternatives outlined above the major difference is in the amount of duplicate information held and the amount of searching which can be done within the regional system. If storage volumes are not a problem then data can be duplicated at little cost (this appears to be the case for IRTIS - particularly in the early years) and local (regional) searching can take place.

80. The third alternative involves the least amount of transfer of data around the network. The first involves the next smallest amount of data transfer, as data from the regional systems flows to the centre only. The second alternative involves transfer in both directions in large amounts. (It is possible that outward transfer could be by tape or disk.) The fourth alternative involves the same amount of transfer, but the data is not stored centrally. For updating the data base, alternative 3 is the easiest, followed by alternatives 1, 4, and 2, in decreasing order of ease.

81. When considering searching for information within the databases, choice of alternative depends on the nature of the searches. If most searches involve looking for regionally generated material, then traffic is equal for all of the alternatives, as there will be about the same amount of going back and forth. Search time will be somewhat better for alternatives 1 and 3 as there are smaller data bases involved. If most searches involve searching for "foreign" data then 2 and 4 are best as the searches can be satisfied locally. If the searches are random then 2 and 4 are again best. Maintaining the compatibility of the data bases is easiest for alternatives 1 and 3. Actual retrieval of information is easiest for alternatives 2 and 4.

82. The choice revolves around the trade off of storage space against increased complexity of maintenance and search time. Given the other constraints on servicing a request and on possible telecommunications problems it seems best to opt for either 1 or 3 with only local data in the regional centres and the central system holding its data and possibly duplicating the regional centres. The suggested choice from these two is 1.

D. Processing organisation

83. The previous subchapters have dealt with alternatives in the physical organisation of the IRTIS network. This subchapter is concerned with alternatives for the distribution of the processing within the network.

84. It is possible to distribute the processing of the data within the network as long as there is sufficient computer power in each of the computer systems to handle the processes. This processing distribution may be done independently of the distribution of the data in the data bases (see subchapter C), although complete independence may lead to vastly increased network traffic to maintain the data bases.

85. The processing which is available for distribution is basically in four sections:

(a) data input or entry - this involves cataloguing and indexing and verification of data;

(b) data base maintenance - involves creating indexes and updating files of stock, etc. at various locations;

(c) query formulation - involves setting up a query and defining output required and formatting output;

(d) query answering - involves searching one or more data bases for answers.

Below is a discussion of the alternatives for each of these processing activities.

1. Data input or entry

86. In the early phases of IRTIS this process is undertaken centrally, but it can be moved out to the regional centres and the national institutions as soon as there is sufficient computer power locally and the staff have been trained in the standards used and the processing system is capable of providing the necessary support at these points.

87. Data entry at the regional centres is almost essential to keep the workload within reasonable proportions as the network grows. Individual institutions should be encouraged to undertake this work when the system and they can support it.

88. Various levels of local input are possible, ranging from form filling and batching records onto floppy disks for posting to another system for verification and maintenance, through to complete authority checking and data base update.

89. It is assumed that the two aspects of data input (the intellectual creation of the descriptive record, and the keying of this into the system) may be treated as one. Most information systems allow that the intellectual creation of the record is done by interaction with the system, thus reaping the benefits of authority files, instant verification, prompting, etc. Whether and how these activities are split is a matter for individual nodes and their desired working patterns.

2. Data base maintenance

90. This processing must be distributed through all the systems which maintain data bases which are remotely accessible. Thus its distribution depends very much on the scheme adopted for the data bases. It is a purely housekeeping function and is internal to the workings of IRTIS.

3. Query formulation

91. This is the heart of the interaction with the user. It may be a simple system for batching up queries and later sending them to a search system. This is simplest to implement, but has a long built in delay for the user.

92. It may be a transparent interface to the search system. This is much more rapid (seconds or minutes versus days or weeks) but requires telecommunications, a computer locally and training for the user (whether a staff member or the end user).

93. It may be a special interface for special users. It may have a restricted set of functions, or translate system messages into a particular language, or other features designed to make it easy to use. It also requires telecommunications and a local computer, but their amount of training necessary should be substantially reduced.

94. This system operates both in formulating a query and in formatting the response. It is the users' view of the system and is thus very important. It is

important that it is responsive to the users' needs and this means that as much as possible of the interaction is either standardised for all users or is processed locally for the particular users.

95. To achieve standardisation the query functions should all be concentrated within the data base systems. This requires more complex programmes, but ensures standard input and output to the users.

96. With local processing of the query it is possible to produce specialised input and output tailored exactly to an individual users requirements. The cost is that the local system must be sufficiently powerful to handle these functions, and the staff must have the time to set them up for their users.

4. Query searching

97. This is a function which must be concentrated where the data bases are. It is the main useful service of the network. It is used not only for online enquiry, but also for the production of printed products from the data bases.

98. The systems which answer queries must be able to search their "local" data base and also communicate with either the central index or data base, or with all the other answering systems so that a comprehensive answer is produced when required.

99. The distribution of this processing is determined by the distribution of the data bases.

5. Discussion

100. The best solution would seem to be to distribute processing so that the central and regional centre systems have essentially the same functions.

101. They should all be capable of accepting data input and updating a data base (only necessary for the regional centres if they are to have data bases). They should all be capable of transmitting and receiving data so that they may be kept up-to-date with each other. They should all be capable of accepting and answering user queries. They should all have some form of output facility. The central system may be the only one that needs sophisticated facilities such as COM (Computer-output-on-microform) or phototypesetting. They must all have the ability to allow users to outline their requirements (parameters) for online use. They must be able to transmit the required information to a query system at a remote user node.

102. The national institution systems should be capable of data input to as sophisticated a degree as possible. They should be capable of formulating queries and translating the responses. Output can be quite simple.

103. The prime requirement of all the systems is that they should be able to communicate with each other.

104. The main reason for distributing processing is to spread the processing load so that smaller cheaper machines may be used locally, user responses may be produced quicker, responses may be more user friendly, and the network as a whole will be more resilient to the failure of one, or more, parts.

E. Recommendations

105. Recommendations have been made at each of the special subchapters above. The effect of the individual recommendations is to produce a system with the following characteristics:

- The communications of the network should allow national institution users access to their local regional centre (possibly also to the central system), and the centres should have access to both the central system and to the systems at the other regional centres.

- Limited user access may be made available depending on the computing and communications facilities available.

- The data from a region should be held in a local regional data base and be duplicated in a centrally held data base.

- Processing should be distributed so that the central and regional centre systems are functionally equivalent.

- Local user systems should be encouraged to undertake as much processing as possible in accordance with the network standards.

This provides a broad outline within which to concentrate on the development of the specialised parts of IRTIS.

IV. DEVELOPMENT PLAN

106. This chapter discusses in outline a plan for the development of IRTIS over the next five years. It covers the activities and the timescale of those activities. Later chapters discuss resources and the particular requirements of the regional centres and institutions and national centres.

107. The development of IRTIS is not only a technical exercise in librarianship, information system design, computing and telecommunications. It is primarily an exercise in fostering co-operation between a number of institutions with common aims and experiencing common problems. As such very real parts of the work involve the development of IRTIS at the national level as a system run by and for the national institutions, the strengthening of the capabilities of these partners in IRTIS, and the direct association, with the evolution of IRTIS, of individual institutions from a number of countries.

A. Activities

108. This subchapter outlines the major activities to be undertaken during the development of an information system and network such as IRTIS.

1. Standards

109. As has been mentioned before standards must be an integral part of the development and running of a distributed system like IRTIS. Standards must be agreed both with the partners in the IRTIS network, and also with the ILIS system of which IRTIS should form a part.

110. Standards should be drawn up by either a working party or by an expert and must then be considered and approved by a consultative committee. This has to be as representative of the users and operators of IRTIS and their parent departments and organisations as possible.

111. In particular IRTIS should attempt to make use of existing standards where they exist; and when they must be developed, it should be done with an eye to their use in a wider context than IRTIS within the ILO.

2. Network

112. The activity here is almost entirely a matter of negotiating with the PTTs and with SYSTEM to achieve the desired kind of connections when required. Here the choice is directly between cost and availability and required performance. Two examples of the sort of negotiations follow.

113. Dedicated telephone circuits may well be required for some connections. These must be justified on volume of traffic grounds, and pressure may have to be put on the PTTs to actually install them where required (and when required¥) and to guarantee maintenance.

114. SYSTEM must be able to provide both the necessary communications programmes when required, and the staff expertise to advise on their installation and to maintain them.

115. Once the technical decision as to the network have been taken the activity is very much administrative.

3. Systems

116. Programmes for the various systems within IRTIS have to be designed and developed. This will require computer expertise.

117. Since the central system will be an implementation of MINISIS it will not need so much to be programmed as to be given parameters within the existing software. Some required features may not exist and these will have to be produced from scratch.

118. Regional centre systems should probably be produced centrally. These can well be microcomputer based systems and do not currently exist.

119. All the developed systems must be tested and then installed at the various sites as appropriate.

120. It is suggested that work here starts with the design and development of the central system to handle the data bases for which data already exist (e.g. training materials). This can then form the prototype on which to base future growth.

4. Data input

121. For this activity, design of procedures and tools such as worksheets and thesauri are necessary. This work has already started and is progressing well.

122. Once items have been designed they must be tested, developed and then put to use. Particularly important here are the procedures for performing essentially the same task in a number of different environments so that a product which is consistent over time and geographical origin is achieved.

123. This area should be a joint responsibility between the Training Policies Branch and the specialist institutions such as the library and, e.g. the Legislative Unit for their particular data base.

5. Training and documentation

124. Producing documentation for any computer system is a very neglected task, but one that is vital if the system is to be useful. It is obviously closely allied to training of both users and staff for maintenance and support.

125. As well as documenting the system, training courses must be organised and run at the appropriate times and places.

6. Administration

126. Development of a system as complex as IRTIS demands a large amount of liaison at all levels. It is necessary to co-operate with special units within the ILO Offfice such as BIBL, SYSTEM, the subject specialist units, etc.

127. It is also vital that external organisations are kept informed and are drawn into the development process. Such organisations as the regional centres, the Turin Centre and the end user institutions.

128. As well as day-to-day liaison such items as newletters, user forums and various steering and consultative committees must be supported.

B. Timescale

129. The activities in this subchapter are not given in any detail at this stage as they cannot be precisely defined yet. Similarly the dates for STARTING and ENDING the activities are only given as year/quarter.

130. Greater precision in either aspect would serve no purpose at this stage of the project. The plan and timescale must be refined from time to time throughout the project in accordance with the project control method adopted. It has not been included as an activity in its own right.

131. It is assumed that the regional centres and the ILO Office will be able to undertake the choice of sites when the time comes for pilot projects and this type of activity has been omitted.

Year 1

START	END	ACTIVITY	RESULT
1.1	-	1	set up standards committee committee to decide on what standards are needed and how they should be set.
1.1	1.1	2	decide network configuration expert committee to produce draft network design.
1.2	-	3	design/test new worksheets activity as already undertaken.
1.2	-	4	liaise with ILIS on standards technical co-operation on continuing basis.
1.2	-	5	document worksheets produce user documentation on how to use worksheets.
1.2	1.3	6	communications link standards standards for the various telecommunications links that will be used within IRTIS.
1.3	-	7	training in worksheets train end users in the worksheets and get feedback for redesign.
1.3	1.3	8	user forum get user and partner responses and ideas.
1.3	1.4	9	record format standards standards (with ILIS) for data base records for training materials and other special classes of material.
1.4	2.1	10	network function standards standards for what functions are to be performed at what parts of the network and how they will interface with (and through) other networks.
1.4	2.1	11	design network design of initial nodes, computers, programmes, data bases and how they fit.

Year 2

START	END	ACTIVITY	RESULT
2.1	2.3	12	design central software design additional programs and adaptions necessary to MINISIS.
2.1	-	13	negotiate with PTTs determine that network can be supplied.
2.2	3.1	14	document central system complete design documents for programs and adaptions.
2.2	2.4	15	develop central system write programs.
2.2	2.2	16	user forum.
2.3	2.4	17	decide regional centre computers.
2.3	2.4	18	provide network (star) PTTs set up initial connections.
2.4	-	19	build data base(s) data entered to the data bases on the central system.
2.4	3.1	20	train users (r/c in central) regional centre staff are trained in the use of the central system.

Year 3

3.1	3.1	21	test central system.
3.1	3.2	22	design regional systems involves regional centre staff as well as central.
3.2	-	23	link central system - external system PTTs provide connections and maintain them.
3.2	3.2	24	user forum.
3.2	4.1	25	document regional system.
3.3	3.4	26	develop regional system.
3.3	4.1	27	cataloguing support standards standards for the cataloguing input side of IRTIS.

Year 4

START	END	ACTIVITY	RESULT
4.1	4.1	28	test regional system.
4.1	4.2	29	train (r/c in r/c) regional centre staff are trained in the use of their new systems.
4.1	4.3	30	produce network (star-ring) PTTs connections.
4.2	4.3	31	install regional systems systems installed in nodes by central staff.
4.2	4.4	32	reorganise data bases to allow for distribution over the regional centres as well.
4.2	4.3	33	distribute data bases data bases set up at regional centres.
4.3	4.3	34	user forum.
4.3	5.1	35	design/develop local system(s) include local users.
4.4	-	36	produce network (connected).

Year 5

5.1	5.1	37	test local system(s).
5.2	-	38	install local system(s) installation by either central staff or regional centre staff or local commercial operation.
5.2	-	39	train users (local) depends on 38.
5.2	5.2	40	user forum.

132. Many of the dates shown above are quite flexible and could easily be moved by up to three quarters in some cases (e.g. 12 could move earlier by 2 - 3 quarters if the staff can be found, thus the whole development trace (12, 15, 21, 22, 23, 26, etc.) could be brought forward by that amount). The estimates are generally quite conservative (i.e. long).

C. Resources

133. This subchapter outlines the resources necessary during the development of IRTIS. It is only an outline derived from the timescale of the preceding subchapter.

1. Human

134. Five different types of persons can be identified for various stages of the developments. They are distinguished mostly by their different skills.

- Administrative staff	- 1/2 person	for 1.1 - 1.4
	1/1	for 2.1 - 5.4
- Specialist staff	- 2 persons (system design/programmer)	for 2.1 - 5.4
	- 1/3 person (telecommunications)	for 1.4 - 5.1
- Experts	- 1/2 person (technical investigations)	for 1.1 - 2.2
- Training/document	- 3/4 person	for 1.3 - 5.4
- General	- 1/10 to 1/20 time (committee members)	for 1.1 - 5.4

135. This gives a total effort of about 14 - 15 work years for the first five years of the development project. Not included is all the extra time by the ILO staff and members of regional and national centres in doing the "little things" that add up to some 2 - 3 years of effort if all counted. (However they are not costed, and as such, don't count.)

2. Computer

136. Computers are potentially required at three levels within IRTIS; the central system, the regional nodes, and the national nodes. The requirements in each case are for quite different machines.

(a) Central

137. For the central system the computer will be an Hewlett-Packard running MINISIS software. Both hardware and software more than adequate technically for the task are available, and will allow for integration of IRTIS gracefully into the ILIS concept.

138. The IRTIS data bases will be small and will start at about 5 megabytes (MB). They will grow to about 30MB by the time all envisaged data bases are loaded and up to full size.

(b) Regional centres

139. With a degree of distribution of both processing and data these systems are in the range of powerful micros not mini or main frame computers.

140. They will need about 6 communication ports, 20MB of disk store, a local printer, and two keyboard/display units. They must be of the "business" micro class and must be capable of exchanging floppy disks with each other and the central system.

141. They need not be all the same make and local support is expected to play a role in this choice. They must run the same operating system for software compatibility.

(c) Local

142. The computers of the national centres and institutions will be whatever they have available or feel they should purchase. The ILO may wish to help by making recommendations in this regard. Standards for communications and for centrally produced "local" software must be laid down early for user's benefit.

3. Communications

143. Communications resources will not, in general, be owned by IRTIS, but will be leased from various PTTs. These resources are the actual copper wires and the telephone exchanges and satellites necessary for communications.

144. This is likely to be a major expense for the life of the network as the leases will be expensive and must be maintained for connections which may not be able to justify the expense at all times. It is impossible to quantify the size of this cost at this point, as it depends on the network design, and the pricing policies of all the concerned PTTs and telephone companies.

4. Other resources

145. Resources will be needed from other services units within the ILO Office and the regional centres and even some national centres for peripheral activities such as training (materials, lecture rooms), publicity (brochures, exhibitions), material delivery (post, facsimile), reprographics (photocopying, microform duplication), loans (inter-centre, inter-regional), etc.

146. Miscellaneous resources will be needed from time to time, usually when they are not available.

D. Regional centres

147. The main load of the regional centres is to promote the use of the facilities of IRTIS to their clients and thus to use the system both themselves and on behalf of others.

148. They will be an important part of the information flow process in both directions. For input they must act initially as collection points for material descriptions, and later as cataloguing centres. On the query side they will always have a requirement to process queries for some users, and will also act as a local data base for more sophisticated institutions to access directly.

149. Their main resource will be their trained staff and it is thus essential that their staff is trained and regularly informed as to progress and new facilities.

E. National centres

150. These centres will be encouraged to take on as much of the workload as possible and thus their staff must be trained in the use of the system. Once trained they become a local resource for the spread of information about IRTIS and how it can be of local use.

F. Training

151. All users must be trained in the use of the system as appropriate for the use that they will make of it. Thus, for regional centres it should cover:

- Central system functions;

  (i) search;
  (ii) printed products;
  (iii) costs of use;
  (iv) benefits;
  (v) when not to use;
  (vi) how to "sell" IRTIS to users;

- Regional systems functions;
- Network operation and control.

For the users it should cover:

- Central system functions;

  (i) search;
  (ii) printed products;
  (iii) costs of use;
  (iv) benefits;
  (v) when not to use;

- Regional systems functions.

This is an outline list only and training on information networks, interchange of information, the value of information, information sources (local, international), etc. should also be included. Finally, it is also necessary to add that training will need to be done in the area of cataloguing and indexing, and that there needs to be good quality control of the data.

V. POLICY ISSUES

152. There are a fairly large number of policy issues which will affect IRTIS. Recommendations on these issues are not germane to this report, but a brief description of the issues follows. Some of them are of current importance, some are of continuing importance, and some have yet to occur.

A. Geographic/State coverage

153. IRTIS will use the regional centres as initial foci. The objective is to encourage the national centres/institutions to undertake as much of the work as possible. IRTIS will concentrate initially on those countries which have established national centres, but will make every effort to encourage the development of national centres in other countries.

B. Intermediaries

154. IRTIS aims at end users. However, there is likely to be considerable use of intermediaries at all stages of IRTIS development, including the operational stage. These intermediaries are seen as coming from within an organisation making enquiries of IRTIS, within an information supply organisation, or as independents from the ILO, a training organisation, or a commercial organisation.

C. Training

155. Training of intermediaries and of end users in the use of IRTIS is a matter to be addressed. This training can be organised on a regional and/or a national basis, can be manual and/or automated.

D. Bilateral co-operation

156. It is important to consider bilateral co-operative agreements between countries and the ILO in relation to the planning and development of IRTIS. Since national competence is one of the most important goals of IRTIS, this is an important issue.

E. Standards

157. This issue has been addressed in a number of other chapters of this report. It is extremely important that there be co-operation in the setting of standards, to ensure uniformity of exchange of information. On a local basis, centres may adopt, or continue to use, local practices, but for IRTIS to operate effectively as a system, it must adopt standards.

F. Inter-system relationships

158. These relationships concern IRTIS with ILIS and IRTIS with other ILO information systems. This necessitates inter-departmental relationships.

159. The critical aspect of this issue is the importance of co-operation within the ILO on all matters affecting development, implementation, and running of information systems.

G. Subject coverage

160. The subject coverage will be all aspects of training. Vocational training is of importance in many areas and this will be the early emphasis. However it is anticipated that the data bases will eventually cover the whole field of training and some of the peripherally related areas as well.

H. Development funding

161. A project such as IRTIS will need development funding. Chapter IV of this report details a development plan, which could be used as the basis for initiating discussions with funding bodies. In addition, the matter of fees for information use/services, must be taken into consideration when discussing funding. This is a heavily-debated issue throughout the entire information industry. Library services have traditionally been free of charge, but use of automated information systems, as well as of specialised information products, is frequently fee-based.

APPENDIX: TECHNICAL TOPICS FOR INVESTIGATION

162. This chapter outlines some of the areas where further technical investigation is necessary. This may be to allow a decision as to the exact route for development to be taken, or it may be to assess the extent of a problem or to define potential standards or procedures.

163. All of the topics raised here have been studied before in other contexts. The need to raise them again is the changed context. Solutions may be adapted or they may be devised anew, that depends on the investigation.

164. There is no particular order in the topics as listed here. Each topic has an indication of its urgency within the subchapter.

A. Communication links

165. A network for carrying information has two distinct components which can be decided on and set up independently. They are the physical and the logical links. This distinction applies whatever the type of network. They answer the questions: How is the information to be carried? and, Where is the information to be carried?

166. The matter of logical links has been discussed in Chapter III. That is a question of planning and policy. The matter of physical links is not.

- Physical links must take account of the telecommunications facilities available in a regional and their cost. Various alternative methods of achieving the same logical link are usually possible and these must be evaluated on technical grounds such as reliability, cost, capacity, availability, etc.

- Within the available physical constraints a variety of network designs are possible at the physical level and the network may operate as dedicated lines, as a packet switched network, as dial-up connections, etc.

- The communications capabilities of each node must be considered and, in some cases, defined as a result of the physical links available.

167. The investigation will require a person knowledgeable in the communications technicalities of information networks. It should involve about 6 weeks work taking about three to five months elapsed time to allow for contact with PTTs, etc. It must be completed before any extensive network implementation can be started.

B. Network commands

168. A network which consists of a number of independently functioning computer systems requires some method for these systems to communicate.

169. This is essential for two reasons. Firstly, in an information network information must be passed between systems; the systems must be told when to send information, to where, how much, in what format, etc. Secondly, traffic within the network must be controlled and the systems must be co-ordinated.

170. The nature of the commands and the functions that they must perform is dictated by the composition of the network, the intelligence of the system nodes, the degree of co-ordination, requirements for security of access, the ability of the systems and the network to recover from failures, etc.

171. It is necessary that the commands are comprehensive and to this end the functions of the network and its structure must be used as input to an investigation.

172. The investigation would require about 8 weeks of time for a computer communications expert and should occupy about three to four months elapsed time. It must be completed before implementation, but after the physical linking investigation.

C. Cataloguing support

173. If cataloguing (this is taken to include data entry and indexing functions) is to be distributed then the network should support this as far as possible.

174. Different users will be able to support cataloguing to different extents by use of trained staff, printed thesauri, worksheets, etc. The IRTIS network should support cataloguing at least to the degree that the "printed" products do.

175. This degree of support and particularly the varied levels of support for different users requires that a sophisticated collection of network cataloguing tools is provided. These may range from worksheet displays through prompts and help functions to an automated thesaural check of all key terms.

176. It is necessary to determine what these services should be, how they can be supported, where they will be available, how users can be trained in their use, when they will be available, to whom they will be available, etc.

177. This is partly a design exercise in data input and cataloguing. It is an investigation which should take about six weeks of work from a computer specialist and a librarian and should take four to six months to complete.

178. It need not be started until phase two or three of the project is being planned and certainly should wait until the basic network structure has crystalised.

D. Inter-centre procedures

179. For a network with distributed processes it is necessary that they are co-ordinated and standardised as much as possible. In fact, many of the standards must be strict requirements for using the system and not optional.

180. These standards must be set and technical committees must be used for much of the work in recommending the standards.

181. Procedures and methods of operation need standards just as much as computer data formats, but are harder to determine and to agree on.

182. Procedures for interchanging information must be set up. This involves deciding where responsibility for each part of the data lies, who is ultimately responsible, when data is required, how it is sent, how it is acknowledged, how it is corrected or amended or added to, etc.

183. Changing data is an awkward process and needs to be defined. Such things as when it should be done, what alternatives to look at, how to change it, what rules to use, who to notify, who makes the changes, how are they distributed, what happens in the meantime, etc., must be considered.

184. These committees will be required to sit from time to time and must liaise with other bodies doing the same or similar work within the ILO or the UN family or the information community. The priority of the task depends on what it being delayed. The length of time of the task depends on any number of things.

E. Record formats

185. A distributed systems network must send information through the network to the systems. For this task it needs well-defined formats and standards.

186. Some of these are defined by the use of MINISIS and the various hardware and telecommunications equipment. Others are available to the developers to define.

187. One prime example is the content of the data messages of the system. This format should follow UNISIST principles, but the details must be worked out. This must be done in conjunction with the systems staff designing and developing the central system data bases and software. However it is a task which needs an expert skilled in both information formats and computer data formats.

188. Such an investigation should involve about eight weeks of work over some six months.

F. Material delivery

189. The supply of information through IRTIS is only part of the total service to the end users. They must be able to obtain the material to which IRTIS has referred them.

190. The supply of the material is a large operation and one that does not have an adequate solution. Investigating this aspect of the operation is really a full-time research task, particularly for delivery within the developing countries.

191. This is a task which must be addressed, though the success, or even operation, of IRTIS does not depend on its solution. It is something that could well be an ongoing task for the whole life of IRTIS.